

## Strategic Plan Summary

The Museum of Science has an extraordinary opportunity to transform itself from a nationally recognized regional museum into an institution with great national impact. Building on our strengths as one of the largest and best centers for dynamic, interactive science exhibits and programs, we envision a bold national and regional agenda to redefine the Museum and how it serves the public. Nationally, we will become the leading museum and science center that, while continuing to present science in innovative ways: helps people understand what technology and engineering are; provides a window into technological development as it happens through partnerships with corporations, universities, hospitals and laboratories; engages people in hands-on learning about design and invention; helps people integrate scientific, social, economic, and environmental issues into their decision-making; and uses new technologies to optimize the visitor and virtual visitor experience.

With Massachusetts as the first state to mandate engineering in the K-12 school curriculum frameworks, we can aid our local school systems and become a national hub for supporting the introduction of technological literacy in formal education. We will prototype exhibits and programs aligned with standard-based K-12 education, creating a *model* for other museums and science centers. Through research, we will inform our own work and become a leader in understanding how people learn in formal and informal science and technology education.

Each of the following elements of the strategy reinforce the others to establish us as a hub for the intellectually active and a model for stimulating both child and adult learning:

- **New and Updated Exhibits and Programs.** The Museum's technological literacy program takes the form of four major, interrelated initiatives, each delivering a mix of exhibits, programs, and complementary online content and interaction. Together, they will bring technology and engineering education in the Museum to a level comparable with science. The Introduction to Technology will let visitors explore what technology is in all its breadth and orient them to the other three areas. Showcase, Playground and Forum all include new information technology-based approaches to engage visitors in exploring the world of technology, in designing and testing technologies, in discussing issues and in decision-making. In addition to this technology-focused effort, the Museum will continue to enhance and develop new science exhibits and programs, and integrate technology and engineering themes into existing exhibits and programs where appropriate.
- **Technology to Enhance our Visitors' Experience.** Information technology offers the opportunity to enhance dramatically the way visitors interact with the Museum. We will use this capability to reach out beyond our traditional family and school audiences; a major component will support science and technology teachers' professional development.
- **Serving Schools and Educators.** The Museum will solidify and expand its role in New England K-12 science and math education and become a national center supporting the introduction of engineering into K-12 education. The Museum will expand programs for educators and add new ones enabled by partnerships with schools, universities and curriculum developers. The Museum will serve as facilitator and advisor to other science centers, universities, school systems and educators nationwide through teacher institutes, informal and for-credit online distance learning programs and a resource center unmatched elsewhere.
- **Research on Learning.** The Museum's programs in science have been informed by a tradition of research in the field of informal science learning and through extensive prototyping and evaluation. Comparable work for subject matter in technology and engineering is still in its infancy. Our research program will jump-start the nation's technological literacy efforts by building a research base about people's perceptions of, knowledge about, and decision-making related to engineering and technology, and how engineering and technology concepts, skills, and processes can best be taught in formal and informal settings.
- **Relationships with Partners.** The Museum is surrounded by world-leading science and technology companies, laboratories, hospitals, and universities. We will feature the work and leverage the expertise of this vibrant community, creating new relationships between our partners and the public.
- **The Adult Audience.** Although the Museum is known for serving family and school audiences, nearly 24% of our audience consists of adults visiting without children. Building on insights from research on adult learning styles, we will offer programs and opportunities for peer interactions that make the Museum a community hub.

• **An Enhanced and Distinctive Facility.** Our facilities will be transformed to create a physical presence communicating the excitement of our mission, enabling the exhibits, programs and infrastructure we envision.

Over the past three years, the Museum has been developing and refining its strategic plan and institutional vision. During an initial six-month period, the Museum's senior management team generated a broad outline and suggested a general approach for meeting these goals. The Museum posed questions about ideas and needs for the future to members of science and technology communities, focus groups of member and nonmember audiences and museum staff. The senior management team was periodically advised by board committees, culminating in a major retreat in which all Trustees and several Overseers were given the opportunity to break down the plan and provide feedback and suggestions. The results of the retreat were further reviewed and refined by a management committee, comprised of the Museum president and vice presidents, during a second retreat in the summer of 2001.

The Museum hired outside management consultants McKinsey and Co. to help further develop the strategic plan, including an understanding of financial implications. McKinsey worked closely with a Task Force, comprised of the Museum's chair of the board and five Trustees. McKinsey submitted a financial analysis and report in December 2001, which underwent a series of board reviews to adopt recommendation and undertaking of a capital campaign.

In 2002, the Museum hosted a National Symposium on Information Technology Education for key representatives from the informal science community to explore their position in the emerging vision for technology education. This provides the basis for the Museum's initiative to develop a new model for informal technology education. A campaign feasibility study was also completed in the summer of 2002.

Initially approved in August 2003, and with a final approval in September 2004, the strategic plan will be implemented over the next five years as follows. In 2004 and 2005, efforts will focus on planning, prototyping, some early program delivery, and developing infrastructure. Activities also will include the early stages of a major capital campaign. In 2006 and 2007, the Museum will use its new programs to create excitement, construct new exhibits, reposition itself and start construction/renovation. The years 2008-2014 will be marked by construction of the updated facility and new exhibits and programs.

Two recent federal appropriations for the Museum's technology and engineering activities gives us seed funding and further validation of our strategic goals. In addition, the Massachusetts Renewable Energy Trust has committed \$2.2 million to the Museum for projects and programs related to public understanding of sustainable technologies, much of which can be devoted to the early stage development of the Center for Sustainable Technologies. Other funders include the Intel Foundation, the Massachusetts Board of Higher Education and the Lockheed Martin Foundation.

What benefits will accrue from this change? "By transforming the Museum, we will better serve our mission to help our public develop their capacities to embrace the future," states former president and director David W. Ellis.

# Predicting the Future: The Science & Technology of Weather Forecasting

## A Unique Partnership for Supporting Weather Education

Submitted by the Museum of Science, Boston

### 1. Project Design

**A New Strategic Goal.** For decades the Museum of Science has served as a valuable resource to more than 250,000 students and teachers who visit every year on field trips. Under new leadership since January, 2003, the Museum has taken on a much more active role in K-12 education. As one of its major strategic goals for the new millennium, the Museum of Science has made a commitment to helping schools in Massachusetts implement the technology/ engineering standards in the *Massachusetts Science and Technology/Engineering Curriculum Framework* (MA DOE, 2001). The Board of Trustees approved this strategic goal in September, 2004.

*Predicting the Future: The Science and Technology of Weather Forecasting*, is a key element of the new vision that will enable teachers to incorporate museum experiences and a standards-based school curriculum. The centerpiece of this project will be a major new permanent exhibit that illustrates how science and technology complement each other in the process of weather forecasting. The new exhibit, which will open in June, 2005, will be built around the Museum's huge van de Graaff generator, which throws off 20-foot "lightning" bolts. The exhibit will be accompanied by a website to help people use web resources to accurately forecast the weather at a specific location a few hours in advance, and video segments for use in the exhibit and for broadcast TV, featuring Mish Michaels, a local meteorologist and role model for minority girls.

A central part of the project is a program especially designed for students and teachers, aimed at helping them understand the science and technology of weather forecasting by learning to make short-term forecasts, called "nowcasts." This school program is called WeatherNet, and has been jointly conducted by the Museum of Science and WBZ-TV Channel 4 for nearly a decade. The WeatherNet Consortium includes more than 100 schools (nearly all in Massachusetts, with a few in southern Maine and New Hampshire) that have a suite of equipment for the automatic monitoring of weather conditions at their school sites. Each WeatherNet school has one teacher assigned as the primary contact with WBZ and the Museum. Every day WBZ-TV features a report from a WeatherNet school on their morning weather broadcast.

Although there is a lot of enthusiasm for this project, few teachers at WeatherNet schools have formal training in teaching about meteorology. In many cases the teachers who arranged for the equipment to be purchased have left the school system, and new teachers are hungry for information about how to use the equipment as part of their instructional program. To meet this need, the Museum of Science and WBZ have collaborated on presenting annual symposia for teachers about how to use the WeatherNet equipment, as well as content background about weather phenomena and measurement, and activities that they can do with their students that relate to learning standards. Last year's symposium, held at the Museum of Science, drew 128 participants. However, brief isolated experiences have been shown to not be sufficient. For this reason, we are requesting funds for an integrated professional development program for teachers at WeatherNet schools that involves a series of experiences at three sites in the Greater Boston area.

The exhibit, web site, and video have been funded by an NSF grant of \$2.1 million. The WeatherNet educational program was cited by several of the NSF reviewers as a very positive aspect of the proposal. However, since the grant was provided by NSF's Informal Education Program, the school programs were not funded. This proposal to the IMLS is intended to support the school programs, allowing teachers to take full advantage of all elements of this project as they meet new and challenging state educational standards.

**IMLS Request.** The Museum of Science respectfully requests a Museums for America grant of \$149,484 over two years from the Institute of Museums and Library Services to complete funding of the *formal education* aspects of *Predicting the Future*, so that the Museum may serve as a center of engagement for the educational community in Massachusetts around the topic of weather. Components of this proposal include:

- A. **Cambridge Pilot Project** to work with teachers at a public K-8 school to develop methods for integrating WeatherNet activities into the school curriculum and create assessment instruments. The project will result in a *Handbook for Teaching About Weather in Massachusetts* appropriate for elementary and middle school teachers, including references and examples of classroom-tested curricula, and ideas for how teachers can make best use of the WeatherNet equipment at their schools.
- B. **Two-Day Summer Institutes** for teacher leaders from WeatherNet schools at the Museum of Science with hands-on activities in how to teach about weather at their grade level.

- C. **Field Trips for Teachers to the Blue Hill Meteorological Observatory**, the oldest existing weather station in North America and the WBZ-TV weather studio.
- D. **Annual Weather Symposia** at WBZ-TV (Channel 4) Studios where WeatherNet teachers meet the WBZ Weather Team, learn about new developments in weather predicting and meet volunteer weather observers, who provide data to the National Weather Service and who are willing to help teachers in their local schools.
- E. **Development of Assessment Instruments** to enable WeatherNet teachers to measure student achievement of weather standards. These will be included in the *Handbook* mentioned above.

Together, the exhibit and proposed educational programs will enable the Museum of Science to serve as a center of community engagement and learning around the favorite New England topic of weather.

**How would this be different from what teachers already do?** Teachers are very strongly driven by state standards. *Predicting the Future* responds to teachers' needs since it directly addresses learning standards in the *Massachusetts Science and Technology/ Engineering Curriculum Framework* that was revised in May, 2001. The *Massachusetts Curriculum Framework* places greatest emphasis on weather in the grade range 3-5. A series of four related standards for that grade level describe what students should know about fundamental concepts related to weather, and the kinds of experiences they should have in observing, measuring, recording and analyzing weather data, and relating their results to short term and seasonal climate variations. At the 6-8 grade level, students are expected to understand global weather patterns.

Weather is also prominent in the *National Science Education Standards* released by the National Research Council in 1996. That weather is emphasized in both state and national standards is not surprising. The collection and analysis of weather data for the purpose of making predictions provides a vivid illustration of the process of science. An understanding of weather also provides the basis for learning more complex subjects such as the mechanisms that drive dynamic Earth systems, creating global weather patterns, seasons and long-term climate change. Perhaps most important for the eventual success of the project is that the study of weather phenomena is fascinating to a great many children and adults, making it an ideal focus for a partnership between informal institutions like museum, and formal school systems.

Unfortunately, we have found that few teachers at the middle school level and almost no teachers at the elementary level are comfortable teaching about weather. Except for a few school districts, that have made a systemwide effort to select weather curricula and provide teacher education, most teachers are not aware of the best instructional materials to support their state standards. The current proposal will meet this important need for professional development at WeatherNet schools. And as we describe below, the impact of the program is likely to reach well beyond WeatherNet schools.

Since the *Massachusetts Framework* places equal emphasis on technology and engineering as it does on science, the programs conducted under this project will reflect this balance. In most schools, the topic of weather is generally taught as a *science* subject. Although many of the best teachers have had their students construct and use simple weather instruments, the focus of instruction has generally been on the process of inquiry and fundamental concepts of meteorology. Placing equal emphasis on *technology and engineering* means spending more class time allowing students to design, build and test their own weather instruments, and to learn about how the interplay between science and technology in the context of weather forecasting.

**Partners.** This proposal has been developed with substantial input from the following community partners:

*WeatherNet Consortium.* The WeatherNet Consortium is a collaboration of more than 100 schools led by the Museum of Science and WBZ-TV Channel 4. This proposal was developed with the assistance of ten veteran WeatherNet teachers who are serving as Advisors on the *Predicting the Future* project. In their view the proposed two-year project will greatly improve the ability of all WeatherNet teachers to serve as leaders in their schools and to sustain the improvements after completion of the grant period.

*Cambridge Public Schools.* The Museum of Science spans the line between Cambridge and Boston. Consequently, we meet regularly with educational leaders from both school districts to plan programs that complement the science and technology curriculum. This is the first year that one of the communities, Cambridge, has elected to join the WeatherNet Consortium. Consequently, we have been meeting with the Director of Science, and the Middle School Mentor Teacher from Cambridge to plan this proposal, and especially the Cambridge Pilot Project, which is described more fully below.

*Blue Hill Meteorological Observatory.* The BHMO is the oldest meteorological observatory in North America, with the longest continuous record of weather observations. The Director of the Observatory is an Advisor on this project, and a Museum of Science staff member serves on the BHMO Board. Joint planning has been underway since the entire *Predicting the Future* project was conceived four years ago. BHMO staff will be intimately involved in the proposed programs for educators.

**Broader Impact and Sustainability.** Prospects are very good for sustaining high quality standards-based weather education at WeatherNet schools after the conclusion of the grant period. The *Predicting the Future* exhibit will be a permanent addition to the Museum, allowing teachers to incorporate the exhibit and related resources into their lessons for years to come. Teachers who participate in *Predicting the Future* programs will be able to train other teachers in their schools, who in turn will provide the kind of education called for in state and national standards.

We also anticipate that the WeatherNet consortium will continue to grow over the years. As a result of this two-year project, the Museum and WBZ will be able to recommend instructional materials and offer workshops for teachers, so that school officials will recognize the educational value of this program, and allocate the funds needed to purchase the equipment, buy instructional materials and conduct workshops that teachers will need to make optimum use of the materials. And after the summer of 2005, educators will be able to learn about WeatherNet in two ways: by watching the daily weather report on Channel 4, and by visiting the Museum's exhibit that will feature the WeatherNet project.

### Key Elements of the Proposed Project

**A. Cambridge Pilot.** One of the newest schools to sign on to the WeatherNet program is the Tobin School, one of eleven K-8 public schools in Cambridge, Massachusetts, with a population of approximately 400 students. For the past year, mentor teachers at the Tobin School have been reviewing potential curriculum materials related to weather, in preparation for the installation of their weather equipment. Preliminary plans are for an in-depth weather unit in grades one and five, with ongoing activities to monitor the weather and share weather information with all students in the school throughout the school year. The Science Coordinator in Cambridge has asked for the Museum's assistance in providing professional development for elementary and middle school mentor teachers and classroom teachers in the first and fifth grades.

The project will begin with a weeklong institute for Cambridge elementary and middle school mentor teachers and Museum staff to work collaboratively, trying out activities, using the equipment and planning the year-long pilot project at the Tobin School. The Cambridge teacher leaders and Museum staff will then conduct professional development activities for first and fifth grade teachers in a series of two-hour sessions, once per month, during the entire school year, as teachers begin to implement weather activities. Activities will focus on the weather curriculum units that are chosen by the team (tentatively from the NSF-supported FOSS curriculum project) aimed at helping teachers better understand the scientific content, as well as analyzing student work, and reflecting on the learning process. Some time will also be spent preparing teachers to take their students on a field trip to the Museum of Science to visit the major new exhibit that will have just opened. Total contact time will be 20 hours. Mentor teachers will provide onsite support for the participants.

The experience of the Cambridge Pilot project will be captured in a brief (5-10 page) Leader's Handbook for teaching weather at the elementary and middle school levels. The Handbook will make recommendations for selecting curricula, utilizing AWS equipment at the school and making best use of the Museum's new weather exhibit. We anticipate that the results of the pilot project, and the Leader's Handbook that will evolve from that experience, will help shape all subsequent professional development activities for WeatherNet teachers throughout New England.

**B. Two-Day Summer Institutes.** Regardless of their levels of expertise and educational background, WeatherNet teachers are generally regarded as the leaders in their schools with respect to weather education. Since they are in charge of the WeatherNet equipment, other teachers often look to them for leadership. However, in many cases WeatherNet teachers are not prepared for leadership, especially at the elementary level, where few have strong science backgrounds. While the annual symposia are valuable educational and motivational events, they involve too many participants and take place over too short a timescale to provide the knowledge and skills that WeatherNet teachers need to serve as leaders in their schools. Although we intend to continue these symposia, there is also a need for leadership training.

To help prepare WeatherNet teacher leaders, we propose a series of two-day summer institutes for the elementary and middle school levels. Two workshops will be provided each summer. Enrollment will be limited to 25 teacher leaders at each workshop. They will be conducted in a Museum lab environment, where the teachers can do activities appropriate for the grade level they teach. In all, 100 teacher-leaders will attend these workshops, over the two years of the grant. During the institute teachers will receive the Leaders' Handbook produced at the conclusion of the Cambridge Pilot Project, and will learn how to:

- Plan and present a series of activities to enable their students to achieve Massachusetts standards related to weather, technology and engineering;
- Enable their students to use data from their own school site as part of the school curriculum;
- Teach their students how to use the nowcasting website currently being developed by TERC under subcontract to the Museum of Science, with funding from NSF;
- Integrate a visit to the Museum's new exhibit, *Predicting the Future*, into their school weather curriculum;

- Assess student knowledge with respect to the targeted standards prior to beginning the unit so as to plan instruction accordingly;
- Assess student learning during and after the unit so as to make adjustments in the learning program; and
- Conduct workshops for colleagues in their schools and districts in how best to teach about weather.

Institutes will first be offered to teachers from schools with WeatherNet equipment. However, all elementary and middle teachers will be invited to apply, provided they can demonstrate opportunities to serve as leaders in their schools and districts.

**C. Field Trips to the Blue Hill Meteorological Observatory (BHMO)** in East Milton, MA (about ten miles south of Boston). BHMO is the oldest, continuously operating weather station in North America and a benchmark station for world climate study. It was from this historic site that weather instruments, lifted by giant kites, were first used to gather information about the vertical structure of the atmosphere.

Field trip opportunities will be offered to WeatherNet teacher leaders and other teachers at WeatherNet schools during the school year. At BHMO, teachers will learn first-hand how the weather is monitored by professionals at a major meteorological observatory. A series of 40 workshops will be planned over the years of the project, so that teachers can sign up for a date that is most convenient for them to attend. Each workshop will accommodate no more than 15 teachers, so that there will be ample opportunity for questions and discussion. Conservatively estimating an average of ten teachers per workshop, approximately 400 teachers will participate in these workshops. Some teachers may arrange to lead their students on a field trip to the observatory at a later date.

**D. Annual Weather Symposia.** We are aware that teachers need support—not only financial support from their school districts, but also in-class support by people who are knowledgeable in the subject and willing to help. Since our staff resources are far too small to visit every classroom, we plan to enlist the aid of teacher leaders, trained through the proposed institutes and Volunteer Weather Observers. These volunteers are individuals who take daily measurements from weather stations mounted in their own backyards and send reports to the National Weather Service (NWS). In fact, the nation's weather prediction and storm warning system depends heavily on the data provided by these volunteers.

We believe that these volunteers can be tremendously helpful to teachers who have very little background and, consequently, low self-confidence in the subject. We already have a list of 12 Volunteer Weather Observers, who have offered to help teachers in their areas, and we expect others will volunteer as well. Each year, all WeatherNet teachers will be invited to attend the annual symposium. We anticipate that many of these teachers will return annually, teamed with their local volunteer, for a new weather experience.

We will introduce teachers to Volunteer Weather Observers who have offered to help teachers in their area during a one-day symposium. While at present we are planning to hold these symposia at the WBZ studios, in the future they might instead be presented at the Museum of Science. WBZ meteorologist Mish Michaels will describe the Volunteer Weather Observer Network and the great service provided by the Network to New England and the nation. Staff will propose guidelines for how the teacher-volunteer teams might best work together, and time will be provided for teachers and volunteer partners to get to know each other and plan next steps.

WBZ's support of the formal education aspect of *Predicting the Future* during the two-year grant period will include contributions of staff time and the purchase of additional equipment for new WeatherNet locations. WBZ also will feature WeatherNet schools on-air 13 times a day, which grandly enhances school pride and visibility for the WeatherNet program. (Please see Attachment C for additional details about WBZ's contribution to the project as described in a letter from WBZ TV.)

**E. Development of Assessment Instruments**, an essential step in any curriculum program, will enable WeatherNet teachers to measure student achievement of weather standards. Where assessment tasks exist, project staff will present them to the teachers during workshops at the Museum of Science, providing opportunities for the teachers to analyze and discuss sample student work. Where such assessment tasks do not exist, project staff will develop them.

Assessment tasks will be used at the start of any program with students, so that teachers can find out what their students already know, as well as any misconceptions that they might have. Similar (but not identical) assessment tasks will be used after completion of a unit on weather, to find out what students did and did not learn. Data from student performance will be used to plan additional activities if necessary, and/or to improve the program for the next school year.

Coordination among all program aspects will be essential, as we envision this wide variety of experiences to constitute a coherent course, with a set of key concepts for grades 3-5.

## 2. Grant Program Goals

The overarching goal of this project is for the Museum of Science to serve as a center for engagement of the educational community in Massachusetts around the topic of weather. Teachers tend to be isolated, with few opportunities to interact with colleagues in the same building, let alone in other districts in the state. The proposed workshops and online collaboration are designed to support and strengthen the community of WeatherNet teachers, so that they can better support each other in implementing challenging new educational standards.

It is now widely recognized that brief, isolated experiences for teachers are unlikely to change teaching practice. The Museum has, therefore, designed an integrated professional development program for teachers at WeatherNet schools that involve a series of experiences at three sites in the Greater Boston area, as described previously. Each program component will help teachers develop classroom lessons and structure educational activities that relate directly to school curricula and learning standards, and that allow them to help other teachers as well. The three experiences—two-day institutes at the Museum of Science, one-day symposium at the WBZ Studio, and a field trip to the Blue Hills Meteorological Observatory—will have complementary learning objectives. Teachers will receive Certificates of Completion for each of these activities, which they may use to obtain Professional Development Points (PDPs). When planned as part of a professional development program, PDPs may be used to enable a school district to document the training that allows a teacher who may not have a major in a discipline, to be considered “highly qualified” under the No Child Left Behind act.

The **intended outcomes** of these experiences are that teachers will: 1) Recognize that they are part of a larger community of educators, working together to help students achieve educational standards; 2) Increase their content knowledge about the theory and practice of weather forecasting; 3) Express greater confidence in and enthusiasm for teaching their students about weather; 4) Implement recommended weather curriculum programs for their students, including hands-on activities that engage students in science and technology; and 5) Make use of Museum exhibits and programs (including video and computer resources) in their teaching.

## 3. How the Project Fits into Strategic Plan and Mission

*The mission of the Museum of Science is to stimulate interest in and further understanding of science and technology and their importance for individuals and society. To accomplish this educational mission, the staff, volunteers, Overseers, and Trustees of the Museum are dedicated to attracting the broadest possible spectrum of participants, and involving them in activities, exhibits, and programs which will: encourage curiosity, questioning, and exploration; inform and educate; enhance a sense of personal achievement in learning; respect individual interests, backgrounds, and abilities; and promote life-long learning and informed and active citizenship. All this is offered in the spirit that learning is exciting and fun at the Museum of Science.*

The Museum’s commitment to support schools in implementing standards in the new *Massachusetts Science and Technology/Engineering Framework* is a strategic decision that grows naturally from our mission. **This project also addresses the Museum’s strategic goal of serving schools and educators.** As such it will provide an opportunity for the Museum to become more effective in meeting its mission and furthering its strategic plan.

The proposed project involving weather is one of several that support this effort. Others include:

- Collecting and evaluating K-12 instructional materials related to technology and engineering;
- Developing new instructional materials at the elementary, middle, and high school levels to fill unmet needs;
- Creating online tools for educators, including a fieldtrip planning website;
- Professional development programs for teachers, guidance counselors, and administrators; and
- A project to work with school district teams in Massachusetts to utilize all of these resources, and create an action plan for implementing the new science and technology educational standards.

In order for these projects to be a model for the nation, we plan to share what we learn with science centers and educators across the country.

**Sustainability.** Prospects are very good for sustaining high quality standards-based weather education at WeatherNet schools after the conclusion of the grant period. First, the WeatherNet Consortium has been supported by the Museum of Science and WBZ TV Channel 4 for a nearly decade. That support will continue, but with the added value of well-trained elementary and middle school teachers, who can mentor new teachers who enter the system. Secondly, once instructional materials are selected and workshops developed with IMLS grant funds, the Consortium can continue to offer educational



programs for teachers at low cost. And finally, the *Predicting the Future* exhibit will be a permanent addition to the Museum, allowing teachers to incorporate the exhibit and related resources into their lessons for years to come. Programs for educators during the two-year project period will be provided free-of-charge. Beyond the grant period, the Museum will continue to offer similar workshops and learning opportunities for a nominal fee.

#### **4. Strategic Plan: Process and Financial Resources**

For decades the Museum of Science has served as a valuable resource to more than 250,000 students and teachers who visit every year on field trips. Under new leadership since January, 2003, however, the Museum has taken on a much more active role in K-12 education. As one of its major strategic goals for the new millennium, the Museum of Science has made a commitment to helping schools in Massachusetts implement the technology/engineering standards in the *Massachusetts Science and Technology/Engineering Curriculum Framework* (MA DOE, 2001).

A capital campaign to accomplish the goals of the Strategic Plan has just been launched, although an overall dollar goal has not been announced. The *Predicting the Future* project is an integral part of the campaign. The goal for both the museum and school components of this project is \$3.1 million. As mentioned above, the NSF has provided \$2.1 million to construct an exhibit about weather around the Museum's huge van de Graaff generator, leaving \$1 million to be raised. So far \$100,000 has been awarded from the Stratford Foundation for the weather exhibit, and \$15,000 has been donated by Capewind Associates for educational programs. Funds requested from the IMLS in this proposal will complete funding for the education programs outlined above. Other proposals are pending to complete funding for the exhibit, which is scheduled to open in June, 2005.

#### **5. Appropriateness of Project for Institution, Audience**

The Museum of Science in Boston is internationally recognized as a leader in informal science education. Our history—stretching back more than 170 years—provides a solid foundation for today's modern center for science and technology education. Through more than 550 interactive exhibits, Omni films, live animal presentations and Planetarium programs, we spark the curiosity of an average 1.6 million visitors a year. Each year, approximately 250,000 students visit the Museum of Science. Offering fun, informal hands-on learning in a dynamic environment, the Museum has resources that many schools do not.

With Massachusetts as the first state to mandate engineering in the K-12 school curriculum frameworks, we are in a position to aid our local school systems and become a national hub for supporting the introduction of technological literacy in formal education. As part of our strategic plan, we will prototype exhibits and programs aligned with standard-based K-12 education, creating a model for other museums and science centers. The proposed project will help us accomplish our mission—to stimulate interest in and further understanding of science and technology and their importance for individuals and society—and the overlapping goals of our strategic plan.

The *Predicting the Future* project seeks to leverage work already underway through the WBZ/Museum of Science WeatherNet project to make a substantial impact on 100 schools. By providing teachers with multiple learning experiences in different contexts, we expect to increase teachers' content and pedagogical knowledge. By increasing resources available to them locally through Volunteer Weather Observers, we anticipate that the teachers will be supported in putting their new expertise to work. And by linking this work with an exciting new long-term exhibition at the Museum of Science we hope to provide students with unforgettable experiences in understanding weather phenomena. (A list of local WeatherNet schools and a summary of workshop evaluation surveys are included in the attachments. The summary shows the needs of the teachers.)

While the value of the program will vary depending on how many of these activities individual WeatherNet teachers participate in, we expect to have substantial impact on all teachers—and their students—in WeatherNet schools. Conservatively estimating that each teacher leader will impact their own classroom plus three other teachers in their school, the project will serve at least 12,000 students.

#### **6. Project Resources: Time and Budget**

A world-class science and technology center, the Museum of Science has a strong track record of fiscal and project management. For example, since FY91, though the New England economy was hit with a recession that resulted in a 75,000 drop in Museum attendance, the Museum has generated eleven consecutive years of operating surplus. This has resulted from a conservative budget process along with tight controls over expenses and measured growth in revenue-producing areas. The Museum's leadership and staff members are experienced in planning and administering projects that involve several Museum departments as well as partnerships with local and national institutions, and that operate within



defined time frames. The Museum has successfully carried out projects supported by a variety of funding sources, including grants from federal and state government institutions.

**Timeline.** *Predicting the Future* program activities will take place during a two-year period, from October 1, 2005 to September 30, 2007, according to the following timeline: The Cambridge Pilot Project will start October 1 and end June 30, 2006. The Handbook for Lead Teachers will be completed by the start of the first summer institute. Two Summer Institutes will occur in the summer of 2006 and two in the summer of 2007. Approximately twenty Field Trips Workshops for Teachers to the Blue Hill Meteorological Observatory will be scheduled in 2005-2006, and twenty in 2006-2007. Annual Weather Symposia at WBZ-TV (Channel 4) will be held in October or November of 2005 and 2006. Development of Assessment Instruments will occur during the pilot project, and be refined as teachers use them throughout the project.

**Budget.** The Museum has received major funding from the National Science Foundation's Informal Science Education program for many aspects of *Predicting the Future*. However, critical programs for teachers and students were not funded under that grant. The Museum is seeking support from private and corporate sources for these aspects of the project. With regard to sustainability it is important to point out that the Museum of Science and WBZ have already sustained a reduced WeatherNet program without major funding since 1995. The two pilot workshops at WBZ Studios in 2001 and 2002 were entirely supported by the Museum and WBZ, and the 2003 workshop was supported by a grant from Capewind Associates. Programs for educators during the two-year project period will be provided free-of-charge. Beyond the grant period, the Museum will continue to offer similar workshops and learning opportunities for a nominal fee.

It is also important to point out that in addition to WBZ's previous support of WeatherNet, there will be a cost share that will be borne by WBZ (as described Attachment C) during the two-year grant period. An additional donation will be made by the Museum of Science. Furthermore, the matching funds for the requested grant from IMLS have already been secured.

**Outcome-based Evaluation.** The Museum will evaluate the success of the project against established goals and outcomes. Staff will submit assessment plans within eight weeks after the award is made.

## **7. Project Resources: Personnel and Technology**

**Principal Investigator:** **Cary I. Sneider** is Vice President for Educator Programs at the Museum of Science. Dr. Sneider's early background includes a degree in astronomy from Harvard College, teaching experience at the middle and high school levels, and a Ph.D. degree in education from the University of California at Berkeley. His research and development interests have focused on helping students unravel their misconceptions in science, and on new ways to link science centers and schools to promote student inquiry. His publications include teachers' guides for the elementary, middle, and high school levels, articles about the instructional uses of computers, and research studies on how children acquire concepts and skills in science. He helped to develop the *National Science Education Standards* (National Academy Press, 1996) and contributed to *Designing Professional Development Programs for Teachers of Mathematics and Science* (Corwin Press, 1998). In 1997 he received the Distinguished Informal Science Education award from the National Science Teacher's Association. Dr. Sneider will have overall responsibility for the creative and administrative aspects of the project, and will help to present the Summer Institutes.

**Teacher Educator:** **Lesley Kennedy** is a 16-year veteran educator at the Museum of Science, where she has conducted a great many programs for teachers, students, and the general public. In recent years she has focused on teacher education, especially preparing teachers to plan field trips that are integrated into their curriculum. She has conducted workshops for other museum educators on topics such as "Rethinking Museum-School Field Trips" presented at the Association of Science-Technology Centers annual conference. She has worked closely with teachers from Cambridge and elsewhere to develop programs on weather that utilize both computer software and hands-on activities. Ms. Kennedy will be primarily responsible for participating in the Cambridge Pilot Program in the first year, and planning and presenting all of the workshops and institutes with assistance from Dr. Sneider, an Education Associate and an Evaluator.

**Education Associate II and Evaluator:** They will assist Ms. Kennedy's work with the project. The individuals will be current Museum of Science employees who have not yet been selected or are yet to be hired.

**Cathy P. Lachapelle** will supervise the work of the evaluator. Dr. Lachapelle has more than ten years of experience in evaluation and assessment of students and teachers in elementary school, middle school, and college related to math, science, and engineering. She has an S.B. in brain and cognitive sciences from MIT and a Ph.D. in psychological studies in education from Stanford.

**Technology:** This project does not involve digitization or acquisition of software technology.

# Project Budget Form

## SECTION 1: SUMMARY BUDGET

Name of Applicant Organization Museum of Science

**IMPORTANT! READ INSTRUCTIONS ON PAGES 3.4–3.5 BEFORE PROCEEDING.**

## DIRECT COSTS

	IMLS	Applicant	Partner(s) (if applicable)	Total
SALARIES & WAGES	<u>48,190</u>	<u>12,321</u>	<u></u>	<u>61,231</u>
FRINGE BENEFITS	<u>11,249</u>	<u>2,834</u>	<u></u>	<u>14,083</u>
CONSULTANT FEES	<u></u>	<u></u>	<u></u>	<u></u>
TRAVEL	<u></u>	<u></u>	<u></u>	<u></u>
MATERIALS, SUPPLIES & EQUIPMENT	<u>2,700</u>	<u></u>	<u>108,290</u>	<u>110,990</u>
SERVICES	<u>17,400</u>	<u></u>	<u>62,000</u>	<u>79,400</u>
OTHER	<u>38,200</u>	<u></u>	<u></u>	<u>38,200</u>
<b>TOTAL DIRECT COSTS</b>	<b>\$ <u>118,459</u></b>	<b>\$ <u>15,155</u></b>	<b>\$ <u>170,290</u></b>	<b>\$ <u>303,904</u></b>
<b>INDIRECT COSTS</b>	<b>\$ <u>31,024</u></b>	<b>\$ <u>6,062</u></b>	<b>\$ <u>0</u></b>	<b>\$ <u>37,086</u></b>
		<b>TOTAL PROJECT COSTS</b>	<b>\$</b>	<b><u>340,990</u></b>

**AMOUNT OF CASH-MATCH**

**\$ 21,217**

**\$** \_\_\_\_\_

### AMOUNT OF IN-KIND CONTRIBUTIONS

\$ \_\_\_\_\_

**\$ 170,290**

**TOTAL AMOUNT OF MATCH (CASH & IN-KIND CONTRIBUTIONS)**

**\$ 191,507**

**AMOUNT REQUESTED FROM IMLS, INCLUDING INDIRECT COSTS**

**\$ 149,484**

**PERCENTAGE OF TOTAL PROJECT COSTS REQUESTED FROM IMLS**  
(MAY NOT EXCEED 50%)

**43.8 %**

Have you received or requested funds for any of these project activities from another federal agency?  
(Please check one) ☐ Yes ☒ No

If yes, name of agency \_\_\_\_\_

Request/Award amount \_\_\_\_\_

# Project Budget Form

## SECTION 2: DETAILED BUDGET

Year ☒ 1 ☐ 2 ☐ 3 - Budget Period from 10 / 01 / 05 to 09 / 30 / 06

Name of Applicant Organization Museum of Science

IMPORTANT! READ INSTRUCTIONS ON PAGES 3.4-3.5 BEFORE PROCEEDING.

### SALARIES AND WAGES (PERMANENT STAFF)

NAME/TITLE	No.	METHOD OF COST COMPUTATION	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
<u>[REDACTED]</u>	(1)	5% of \$119,600 + raises		6,040		6,040
<u>[REDACTED]</u>	(1)	25% of \$61,370 + raises	15,496			15,496
<u>[REDACTED]</u>	(1)	7.5%-10% of \$52,000	4,978			4,978
<u>[REDACTED]</u>	(2)	10% of \$35K / 5 hrs. x \$16.50	3,823			3,823
TOTAL SALARIES AND WAGES \$			24,382	6,040		30,422

### SALARIES AND WAGES (TEMPORARY STAFF HIRED FOR PROJECT)

NAME/TITLE	No.	METHOD OF COST COMPUTATION	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
<u>                    </u>	( )	<u>                                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	( )	<u>                                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	( )	<u>                                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	( )	<u>                                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
TOTAL SALARIES AND WAGES \$			<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>

### FRINGE BENEFITS

RATE		SALARY BASE	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
23	% of \$	30,422	5,608	1,389		6,997
	% of \$	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
	% of \$	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
TOTAL FRINGE BENEFITS \$			5,608	1,389		6,997

### CONSULTANT FEES

NAME/TYPE OF CONSULTANT	RATE OF COMPENSATION (DAILY OR HOURLY)	NO. OF DAYS (OR HOURS) ON PROJECT	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
TOTAL CONSULTANT FEES \$			<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>

### TRAVEL

FROM/TO	NUMBER OF: PERSONS DAYS	SUBSISTENCE COSTS	TRANSPORTATION COSTS	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
<u>                    </u>	( ) ( )	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	( ) ( )	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	( ) ( )	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	( ) ( )	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
TOTAL TRAVEL COSTS \$				<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>

# Project Budget Form

## SECTION 2: DETAILED BUDGET CONTINUED

 Year ☒ 1 ☐ 2 ☐ 3

### MATERIALS, SUPPLIES AND EQUIPMENT

ITEM	METHOD OF COST COMPUTATION	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
Summer Inst. materials	\$15 x 50 participants	750			750
WBZ Symposium mat'ls	\$6 x 100 participants	600			600
WeatherNet upgrades				54,145	54,145
<b>TOTAL COST OF MATERIALS, SUPPLIES, &amp; EQUIPMENT \$</b>		1,350		54,145	55,495

### SERVICES

ITEM	METHOD OF COST COMPUTATION	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
Blue Hill Meteor. Obs.		8,700			8,700
WBZ-TV Staff				31,000	31,000
<b>TOTAL SERVICES COSTS \$</b>		8,700		31,000	39,700

### OTHER

ITEM	METHOD OF COST COMPUTATION	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
Pilot Project Stipends	\$60-\$600 x 22 participants	6,800			6,800
Summer Inst Stipends	\$240 x 50 participants	12,000			12,000
Workshop amenities	\$15-\$22/day x 100 person-day	3,700			3,700
<b>TOTAL OTHER COSTS \$</b>		22,500			22,500

<b>TOTAL DIRECT PROJECT COSTS \$</b>	62,540	7,429	85,145	155,114
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### INDIRECT COSTS

Check either item A or B and complete C. (See section on Indirect Costs, page 3.5.)

Applicant organization is using:

- ☐ A. An indirect cost rate which does not exceed 15 percent of modified total direct costs charged to IMLS.  
☒ B. Federally negotiated indirect cost rate (see page 3.5).

National Science Foundation

Name of Federal Agency

4/30/04 (new rate in negotiation)

Expiration Date of Agreement

C.	Rate base(s)	Amount(s)		
40	% of \$	46,120	= \$	18,448
	% of \$		= \$	
	% of \$		= \$	

	IMLS	APPLICANT	PARTNER(S) IF APPLICABLE	TOTAL
<b>TOTAL INDIRECT COSTS CHARGED TO \$</b>	15,476	2,972		18,448

# Project Budget Form

## SECTION 2: DETAILED BUDGET

Year ☐ 1 ☒ 2 ☐ 3 - Budget Period from 10 / 01 / 06 to 09 / 30 / 07

Name of Applicant Organization Museum of Science

IMPORTANT! READ INSTRUCTIONS ON PAGES 3.4-3.5 BEFORE PROCEEDING.

### SALARIES AND WAGES (PERMANENT STAFF)

NAME/TITLE	No.	METHOD OF COST COMPUTATION	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
<u>[REDACTED]</u>	(1)	5% of \$119,600 + raises		6,281		6,281
<u>[REDACTED]</u>	(1)	25% of \$61,370 + raises	15,286			15,286
<u>[REDACTED]</u>	(1)	7.0%-10% of \$52K + raise	5,177			5,177
<u>[REDACTED]</u>	(2)	10% of \$35K / 5 hrs. x \$17	3,976			3,976
TOTAL SALARIES AND WAGES \$			24,528	6,281		30,809

### SALARIES AND WAGES (TEMPORARY STAFF HIRED FOR PROJECT)

NAME/TITLE	No.	METHOD OF COST COMPUTATION	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
<u>                    </u>	( )	<u>                                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	( )	<u>                                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	( )	<u>                                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	( )	<u>                                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
TOTAL SALARIES AND WAGES \$			<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>

### FRINGE BENEFITS

RATE		SALARY BASE	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
23	% of \$	30,809	5,641	1,445		7,086
	% of \$	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
	% of \$	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
TOTAL FRINGE BENEFITS \$			5,641	1,445		7,086

### CONSULTANT FEES

NAME/TITLE OF CONSULTANT	RATE OF COMPENSATION (DAILY OR HOURLY)	NO. OF DAYS (OR HOURS) ON PROJECT	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
<u>                                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
TOTAL CONSULTANT FEES \$			<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>

### TRAVEL

FROM/TO	NUMBER OF: PERSONS DAYS	SUBSISTENCE COSTS	TRANSPORTATION COSTS	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
<u>                    </u>	( ) ( )	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	( ) ( )	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	( ) ( )	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>                    </u>	( ) ( )	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
TOTAL TRAVEL COSTS \$				<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>

# Project Budget Form

## SECTION 2: DETAILED BUDGET CONTINUED

 Year ☐ 1 ☒ 2 ☐ 3

### MATERIALS, SUPPLIES AND EQUIPMENT

ITEM	METHOD OF COST COMPUTATION	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
Summer Inst. materials	\$15 x 50 participants	750			750
WBZ Symposium mat'ls	\$6 x 100 participants	600			600
WeatherNet upgrades				54,145	54,145
<b>TOTAL COST OF MATERIALS, SUPPLIES, &amp; EQUIPMENT \$</b>		<b>1,350</b>		<b>54,145</b>	<b>55,495</b>

### SERVICES

ITEM	METHOD OF COST COMPUTATION	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
Blue Hill Meteor. Obs.		8,700			8,700
WBZ-TV Staff				31,000	31,000
<b>TOTAL SERVICES COSTS \$</b>		<b>8,700</b>		<b>31,000</b>	<b>39,700</b>

### OTHER

ITEM	METHOD OF COST COMPUTATION	IMLS	APPLICANT	PARTNER(S) (IF APPLICABLE)	TOTAL
Summer Inst Stipends	\$240 x 50 participants	12,000			12,000
Workshop amenities	\$15-\$22/day x 100 person-day	3,700			3,700
<b>TOTAL OTHER COSTS \$</b>		<b>15,700</b>			<b>15,700</b>

<b>TOTAL DIRECT PROJECT COSTS \$</b>	<b>55,919</b>	<b>7,726</b>	<b>85,145</b>	<b>148,790</b>
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### INDIRECT COSTS

Check either item A or B and complete C. (See section on Indirect Costs, page 3.5.)

Applicant organization is using:

- ☐ A. An indirect cost rate which does not exceed 15 percent of modified total direct costs charged to IMLS.  
☒ B. Federally negotiated indirect cost rate (see page 3.5).

National Science Foundation

Name of Federal Agency

4/30/04 (new rate in negotiation)

Expiration Date of Agreement

C.	Rate base(s)	Amount(s)		
40	% of \$	46,595	= \$	18,638
	% of \$		= \$	
	% of \$		= \$	

	IMLS	APPLICANT	PARTNER(S) IF APPLICABLE	TOTAL
<b>TOTAL INDIRECT COSTS CHARGED TO \$</b>	<b>15,548</b>	<b>3,090</b>		<b>18,638</b>

## Museum of Science

### IMLS - Predicting the Future Budget Justification

Salaries (Note: All salary calculations are based on current annual salary and assume 4% annual increases effective July 1.)  
[REDACTED] - Will have both administrative and content/creative responsibilities during the project, including presentation of the Summer Institutes. In total, he is expected to spend approximately 5% of his time on the project, all of which will be funded from the Museum's own internal resources as Cost Share.

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	0	0	0
Applicant	6,040	6,281	12,321
Partners	0	0	0

[REDACTED] - Will be responsible for the Cambridge Pilot Program in Year 1, and will plan and present at all of the project's institutes and workshops. She is expected to devote 25% of her time over most of the course of the project.

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	15,496	15,286	30,782
Applicant	0	0	0
Partners	0	0	0

[REDACTED] - Will work on an ongoing basis with Dr. Sneider and Ms. Kennedy to evaluate the instructional techniques developed during the project, and integrate the findings into the Museum's comprehensive research and evaluation program under our VP of Research. S/he will devote 7.5% of his/her time for most of the project period, increasing to 10% during those quarters wherein workshops are held.

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	4,978	5,177	10,155
Applicant	0	0	0
Partners	0	0	0

[REDACTED] - Will assist Ms. Kennedy in the preparation and presentation of the institutes and workshops. 10% of time over the entire project.

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	3,823	3,976	7,799
Applicant	0	0	0
Partners	0	0	0

[REDACTED] - Will devote several hours each year to provide technical support for those of the institutes and workshops which are hosted in the Museum.

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	85	89	174
Applicant	0	0	0
Partners	0	0	0

Benefits - The Museum charges fringe benefits as a direct cost at 23% of salaries for full-time staff.

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	5,608	5,641	11,249
Applicant	1,389	1,445	2,834
Partners	0	0	0

### Materials, Supplies and Equipment

*Instructional materials* for the WeatherNet Summer Institutes are budgeted at \$15 for each of 50 participants each year. Those to be used in the WBZ Symposia are budgeted at \$6 for each of 100 participants.

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	1,350	1,350	2,700
Applicant	0	0	0
Partners	0	0	0



As part of their contribution to the project, WBZ will provide *equipment upgrades and AWS software licenses* for the WeatherNet.

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	0	0	0
Applicant	0	0	0
Partners	54,145	54,145	108,290

#### Services

*Blue Hill Meteorological Observatory* - Will host a field trip each year and provide instructional support.

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	8,700	8,700	17,400
Applicant	0	0	0
Partners	0	0	0

*WBZ* - Will provide significant staff time towards the project, including instructional support for the Symposia and ongoing work with WeatherNet participants and Museum staff in developing, presenting, and checking content.

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	0	0	0
Applicant	0	0	0
Partners	31,000	31,000	62,000

#### Other Costs

*Stipends* will be provided to participants in the Pilot Program and the Summer Institutes as follows:

Pilot Program - K-6 Mentor Teachers	\$60 for each of 10 teachers
Pilot Program - Grades 1 & 5 Teachers	\$60/month x 10 mo. x 10 teachers
Pilot Program - Facilitators	\$100 for each of 2
Summer Institute participants	\$120/day x 2 days x 50 teachers

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	18,800	12,000	30,800
Applicant	0	0	0
Partners	0	0	0

*Workshop amenities* - Lunch will be provided to Symposium participants (\$15 x 100 ppl.). Breakfast and lunch will be provided to Summer Institute participants (\$22 x 50 ppl. x 2 days).

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	3,700	3,700	7,400
Applicant	0	0	0
Partners	0	0	0

#### Indirect Costs at 40% of MTDC

For the purposes of our IMLS proposal, MTDC consists of Direct Costs less Participant Support and Equipment, leaving only the Museum's own Personnel costs and the Blue Hill Observatory subaward eligible for IDC.

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	15,476	15,548	31,024
Applicant	2,972	3,090	6,062
Partners	0	0	0

#### Total Costs

	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
IMLS Request	78,016	71,467	149,484
Applicant	10,401	10,816	21,217
Partners	85,145	85,145	170,290
	173,562	167,428	340,990